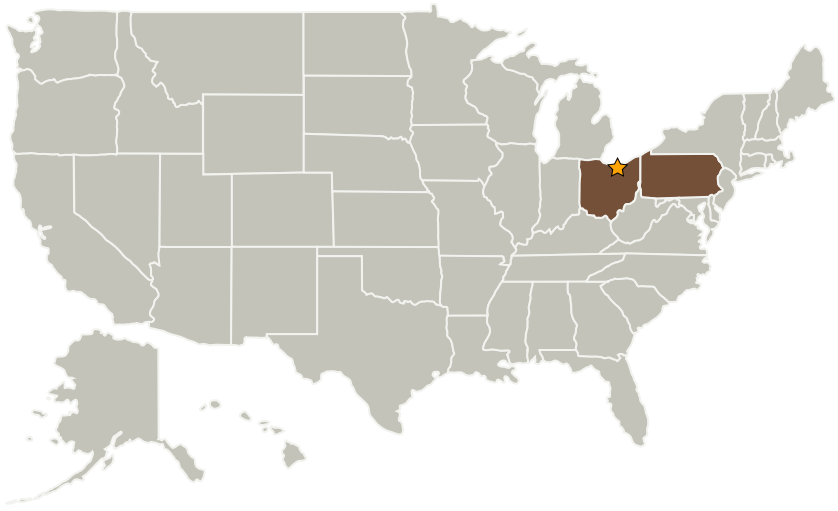
The Effects of Radiation and Thermal Stability of Sm-Co High Temperature Magnets For High Power Ion Propulsion, Phase I

Completed Technology Project (2004 - 2005)

Project Introduction

Since high temperature Sm-Co based magnets were developed, a number of new applications have been introduced. NASA?s Xe+ ion propulsion engine used in Deep Space I (DS-I) is a prime example. The magnets with coating perform well at temperatures up to 550?C. Magnets without coating perform well in the current 10 kW Xe+ ion engines in the vacuum which exists in space and at temperatures up to 400?C. Additional challenges are expected in the missions NASA is planning. The new missions, with higher-powered engines, include travel toward the sun, to Jupiter, and planets beyond. In these higher-powered engines (> 10 kW) temperatures are expected to reach 550°C in vacuum to ~10-5 Torr. Technical data of the high temperature Sm-Co in the conditions of the NASA?s new mission are needed. This program proposes to study the effects of radiation on physical and magnetic properties, and the thermal stability and its improvement, in vacuum at temperature up to 550?C, of Sm-Co high temperature magnets. Based on the results of this work, improvements to Sm-Co magnets will be made to enhance the performance of high power Xe+ ion propulsion engines.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Electron Energy Corporation	Supporting Organization	Industry	Landisville, Pennsylvania

Primary U.S. Work Locations	
Ohio	Pennsylvania

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Christina Chen

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.1 Integrated Systems and Ancillary Technologies